

*MIMULUS NORRISII* (SCROPHULARIACEAE), A NEW  
SPECIES FROM THE SOUTHERN SIERRA NEVADA

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ABSTRACT

*Mimulus norrisii*, a new cliff-dwelling species from the Sierra Nevada foothills primarily in Sequoia National Park, Tulare County, California, is described and illustrated. The new species is ecologically similar and morphologically closest to *M. dudleyi* in sect. *Paradanthus* but differs in its moister habitat requirements, leaves with attenuate bases and less serrate margins, and in particular the smaller calyces that develop conspicuous enlarged and rounded ribs.

This attractive new species of *Mimulus* was discovered by the second author and Larry Norris, Naturalist in Sequoia National Park. Review of *Mimulus* specimens in California herbaria (CAS, DS, JEPS, POM, RSA, UC) failed to locate a collection of the new species. That it has been overlooked by botanists remains a mystery, but most plant collections from the Park have been from the coniferous forests and alpine environments during the summer months and the lower elevations within the chaparral and blue oak communities have not been systematically surveyed. Other additions to the Park flora (*Draba cuneifolia*, *Notholaena jonesii*, and *Parietaria hespera* var. *hespera*) also come from the marble outcrops associated with the new *Mimulus*.

*Mimulus norrisii* Heckard & Shevock sp. nov.

Planta annua dense glanduloso-villosa, caulibus adscendentibus. Foliorum paginae ovatae leniter repando-denticulatae, palmato-venosae, basibus attenuatis vel cuneatis. Calyx apud florem 3.5–5.0 mm longus campanulatus, dentibus deltatis ca. 1.5 mm longis, apicibus obtusis vel leviter mucronatis. Calyx apud fructus 5–6 mm longus, urceolatus, costis ampliatis, rotundatis. Corolla 15–30 mm longa, infundibuliformis faucis brevi-expansa et limbo quasi rotato (Figs. 1, 2).



FIG. 1. *Mimulus norrisii*. Top: Marble outcrop habitat at Comb Rocks, the type locality. Shrubs in foreground are *Toxicodendron*. Bottom: Habit of plants in rock crevice.



FIG. 2. *Mimulus norrisii*. Lateral view of flower showing pedicel and calyx and their indument, and the widely flaring corolla.

Annual with diffuse roots; stems ascending, 3–15(–25) cm long with internodes reaching 6–7 cm, sometimes branched from lower nodes, often floriferous from near base, the longer stems often geniculate; herbage densely glandular-villous (particularly in nodal regions) with trichomes mostly under 1 mm, occasionally to 2 mm. Leaves usually 2–5 pairs per stem, the blades ovate with attenuate to cuneate bases, mostly 2.0–3.5 cm long and 1–2 cm wide, weakly repand-denticulate with 3–5 pairs of small teeth on upper  $\frac{2}{3}$  of blade, reduced and often narrowed upwards on stem, palmately 3–5 veined or upper pair (and occasionally 1–2 additional veins) diverging pinnately from parallel unfused veins of midrib, typically the veins running distinct into the petiole; petiole 0.5–1.5 cm long, not sharply delineated from the tapering blade, reduced upwards on stem. Flowers axillary on slender ascending pedicels 2–5 cm long, the pedicels reflexed in fruit and sometimes hooked at the apex; calyx in anthesis 3.5–5.0 mm long, narrow-campanulate, sulcate between rounded ribs, rib region strongly glandular-pilose, usually infused or spotted with purplish red, sulca paler with less spotting and sparser indument; calyx teeth ca. 1.5 mm long, rounded deltate with apices obtuse to slightly mucronulate, inwardly concave; calyx in fruit elongating to 5–6 mm, becoming somewhat urceolate with incurving of lobes and expansion of thinner and paler inter-rib region during capsule enlargement, the ribs enlarged and rounded; corolla caducous, fun-

nelform, 15–30 mm long, the tube gradually widening to about midpoint, expanding to form short, open flaring throat and spreading to almost rotate limb made up of nearly equal lobes (6–10 mm long) that are broader than long, rounded to truncate and often retuse to emarginate, centrally grooved; corolla yellow, marked on throat centrally below each lobe with bilobed to irregular maroon-purple blotches (mostly one per lobe except several smaller ones on central lobe of lower lip), usually with two white spots on throat beneath the two sinuses forming the central lobe, weakly puberulent and sometimes glandular on exterior, the inner surface of lobes with scattered yellow clavate hairs that become smaller and denser on palatal folds of throat and down tube; stamens glabrous, included in lower one-half and attached near tube base, the upper filaments 3.5–4.0 mm long, the lower filaments 5–6 mm long; anthers explanate, longitudinally oriented, ca. 1 mm long; gynoeceium ca. 10 mm long, style ca. 6 mm long, the stigma ca. 1.0 mm long, exceeding anthers by ca. 1–3 mm, bilamellate with equal, spreading lobes that are rounded and fimbriolate; capsule narrow-ovoid, 4–6 mm long, about equalling calyx, often unequally developed on opposite sides of style base, the style eventually breaking near the base leaving short, curved apiculation, the placentae adherent to apex, dehiscing full length along both sutures; seeds many (up to 100/capsule), ellipsoid-oblong, longitudinally minutely rugose-striate, tawny-colored, ca. 0.5 mm long. Chromosome number  $2n = 32$ .

TYPE: USA, CA, Tulare Co.: Comb Rocks above Washburn Cove, 2 mi n. of Three Rivers, T17S R28E S1, 2800 ft. (854 m), 1 May 1983, *L. L. Norris 389*. (Holotype: JEPS; isotypes: CAS, FSC, K, MO, NY, RSA, US.)

PARATYPES: USA, CA, Tulare Co.: West ridge of Blossom Pk., South Fork Kaweah River, Three Rivers, T17S R28E S25, 19 Mar 1984, *Norris 627* (JEPS); Comb Rocks, 2 mi n. of Three Rivers, T17S R28E S1, 1 May 1983, *Shevock 10353* (CAS); Sequoia Nat'l. Park: Divide between Elk Cr. and Marble Fork Kaweah River, T16S R29E S23, *Norris 351* (JEPS) and *Shevock 10165* (CAS); 19 Mar 1983, *Norris 354* (RSA) and *Shevock 10187* (CAS, JEPS); 18 Apr 1983, *Shevock 10330* (CAS, JEPS, RSA); 12 May 1983, *Bacigalupi 9350* (JEPS, OSC, SD); and 24 Apr 1984, *Norris 638* (CAS, FSC, JEPS, MO, RSA); Generals Highway 0.7 mi e. of Ash Mtn., T16S R29E S34, 30 Mar 1983, *Norris 363* (SBBG, UC); and 24 Apr 1984, *Norris 637* (JEPS); Yucca Point just n. of Ash Mtn., T16S R29E S34, 18 Apr 1983, *Norris 372* (JEPS) and *Shevock 10329* (CAS, RSA); 12 May 1983, chromosome voucher,  $n = 16$ , *Bacigalupi 9344* (CHSC, JEPS, OBI, WTU); Clough Cave, South Fork Kaweah River, T18S R30E S19, 19 Mar 1984, *Norris 626* (JEPS); Above Alder Cr. near Ash Mtn., T16S R29E S34, 23 Mar 1984, *Norris 631* (THRI).



*Distribution, habitat and phenology.* Marble outcrops in chamise chaparral or blue oak woodland, Kaweah River drainage, 610–1310 m, southern Sierra Nevada within Tulare Co., California; most populations located within Sequoia National Park. Flowers March–May. The plants find footholds in soil pockets, moss covered ledges, cracks and fractures in the marble outcrops, primarily in areas with concentrations of beige-colored deposits of calcium carbonate. Steep east- or west-facing outcrops have the densest concentrations of plants, although plants do occur sparingly on south-facing cliffs. Light regimes vary during the day from full sun to full shade. The most robust plants occur where dripping water from mossy overhangs keeps the cliff face moist.

*Associated species.* *Asterella californica*, *Anacolia menziesii* var. *baueri*, *Bryum pseudotriquetrum* var. *bimum*, *Encalypta vulgaris*, *Selaginella hanseni*, *Aspidotis californica*, *Cheilanthes cooperae*, *Notholaena jonesii*, *Pellaea mucronata*, *Pityrogramma triangularis*, *Dudleya cymosa* subsp. *cymosa*, *Eriogonum nudum* subsp. *murinum*, *Lithophragma bolanderi*, *Parietaria hespera* var. *hespera*, *Pterostegia drymarioides*, *Toxicodendron diversilobum* and *Yucca whipplei* subsp. *caespitosa*.

Populations of *Mimulus norrisii* are fairly common on all marble outcrops investigated in the Kaweah River drainage. The total area of the marble habitat, however, is estimated at only 200 hectares. The number of plants occupying the available habitat can only be grossly estimated because of the inaccessibility of the rugged cliff habitat on which the species occurs. We expect population size to vary markedly from year to year. Following an exceedingly wet winter (1983) for the southern Sierra Nevada, we estimated a total population of 7000 individuals. Essentially all populations are free from disturbances by man.

*Mimulus norrisii* belongs to the sect. *Paradanthus*, an assemblage of about 70 species that Grant (1924) proposed to accommodate “a collection of groups not necessarily related to one another and in all probability most of them have been derived from members of other sections” (p. 117). The relationship of *M. norrisii* within this poorly understood and possibly polyphyletic section is equivocal. In most features, *M. norrisii* is closest to *M. dudleyi* Grant of the *M. floribundus* Dougl. ex Lindl. alliance, but the smaller, campanulate (to urceolate in fruit) calyx with thickened and rounded ribs is quite unlike that in the *M. floribundus* group. Thickened calyx ribs are found in only two other species of the section—*M. bicolor* Hartw. ex Benth. and *M. filicaulis* Wats. (the latter includes *M. biolettii* Eastw. according to Bacigalupi [1981])—but these species differ from *M. norrisii* in several well-marked features, including size and shape

of calyx as well as the type of thickening itself. Thus their calyx is cylindrical-oblong with pointed lobes and the "corky ribs," as Grant (1924) and Pennell (1951) described the strongly developed rib angles, are composed of softer tissue than in *M. norrisii*. Based on these differences in the calyx, it seems likely that thickening of the ribs has evolved independently in *M. norrisii* and the *M. bicolor-filicaulis* group.

Our opinion that the nearest relative of *Mimulus norrisii* is *M. dudleyi* is based on their basic similarity in nearly all morphological respects, except the calyx and a few minor traits. The calyx of *M. dudleyi* is narrow-campanulate (with spreading pointed lobes) and ridge-angled in flower, becoming narrowly oblong with erect or spreading lobes in fruit in contrast to the shorter calyx of *M. norrisii*, which changes from campanulate (with rounded lobes) in flower to urceolate with thickened ribs in fruit. Although the plants of both species are petrophilous, their habits differ in that *M. dudleyi* is prostrate-ascending over granitic rocks, while *M. norrisii* is loosely erect or hanging from marble cliffs. Other differences are that the leaves of *M. dudleyi* have obtuse to truncate bases and much more pronounced serrate margins than those of *M. norrisii*, in which the bases are tapered and the margins are sparingly denticulate. Although both species have stems that are geniculate at times, only *M. norrisii* has (fruiting) pedicels that are reflexed and sometimes hooked at the tips, which facilitates very local dispersal of seeds. The corollas of the two species appear remarkably similar in shape and color, as are the short stamens and style-stigma that are included well within the tube. There are slight differences in corolla markings between the two species: *M. dudleyi* lacks the two white spots between the lower lobes and has the maroonish markings at the base of the lobes as flecks that are in less discrete blotches than in *M. norrisii*. The same chromosome number ( $2n = 32$ ) has been found by Dr. T.-I. Chuang in *M. norrisii* (cited above) and *M. dudleyi* (CA, Tulare Co.: 10 mi se. of Porterville, Heckard and Chuang 4003).

Although *Mimulus norrisii* and *M. dudleyi* both occur in the foothills of the southern Sierra Nevada, they occupy different habitats and their elevation ranges rarely overlap. Thus plants of *M. norrisii* are in damp and mostly shaded situations on cliffs of metamorphic rock in chamise chaparral (above 600 m). *Mimulus dudleyi*, on the other hand, is mostly at lower elevations in valley grassland or blue oak savanna and occurs on granitic outcrops that are in full sun most of the day and are wet only for short periods following rains. The liverworts, mosses, and ferns typically associated with *M. norrisii* are absent in this latter habitat.

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#### ANNOUNCEMENT

The Graduate Student Meetings, sponsored by the California Botanical Society, will be held this year at the University of California, Santa Barbara, on October 19 and 20, 1985. Graduate students wishing to present papers should prepare abstracts to be submitted when the call for abstracts is announced in August. Please contact Ms. Kathy Rindlaub, Department of Biological Sciences, University of California, Santa Barbara 93106, or Mr. Joseph M. DiTomaso, Department of Botany, University of California, Davis 95616, for information on registration, schedule of events, field trips, and the banquet.